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OUTBREAKS OF AUJESZKY'S DISEASE IN THE 'RISHANGLES TRIANGLE' APRIL 1974

Agricultural Memorandum No. 869

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Introduction

Aujeszky's disease (also known as 'pseudo-rabies' or 'mad-itch') was first described by Aujeszky in Hungary in 1902; it was only first suspected in England and Ireland in 1938. The disease is very severe in cattle, dogs and cats, but the pig seems to be the natural host and reservoir of the virus. The young piglet is particularly at risk. The onset of the disease is usually sudden and the younger the litter the more severe it is, new born piglets dying within a few hours. Clinical signs include nervous disorders such as inco-ordination, scouring, vomiting and respiratory distress. After inhalation of the virus the disease takes some 24 hours to manifest itself; however, the virus can survive in the housing environment for around seven days under favourable circumstances.

Outbreaks in this country have been scattered, with three geographical foci: Humberside, East Anglia and SW England (fig 1) most involved pigs a few days to about four weeks old.

The disease within the 'Rishangles Triangle'

A request was received from the National Pig Specialist for any meteorological advice that could help with an assessment of the disease situation. Although much of the disease information was only defined in terms of a month of occurence, more detailed information was available on outbreaks in the 'Rishangles' area of Suffolk which has been the focus of the disease in East Anglia and indeed the whole country since 1974 (and had been the subject of a MAFF intensive R & D project).

The following table lists the progression of the disease outbreaks amongst premises; a map illustrates their position within the 'Rishangles Triangle' (Fig 2).

Standley	9:4:74
Lomax	14:4:74
Abbott	17:4:74
Bullen	19:4:74

One point of the meteorological investigation was to see if it re-inforced the view that 'Munter's muck heap' could have been the original source of infection; he maintained his stock developed no signs or symptoms of the disease until late 1974.

This memorandum presents an analysis of the possible progression of the disease in the Rishangles Triangle using the ideas of wind-borne particulate deposition developed by meteorologists in connection with epidemics of other diseases. It is the text of the reply to the National Pig Specialist in January 1978.

This and subsequent analyses have been alluded to in a recent publication by Basinger (1979).

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Meteorological aspects

A request for assistance in explaining the sequence in space and time of outbreaks of Fowl Pest (Newcastle Disease) in the early 1960's led meteorologists to take the view that an intensive poultry unit represented a point source of virus-infected particulates. By allowing for down-wind spread of infection it was found possible to demonstrate that airborne infection over distances of the order of tens of km could account for some 85% of outbreaks in the two Bedfordshire epidemics in the Springs of 1960 and 1962.

When a major 'Foot and Mouth' disease epidemic struct in 1967 the airborne particulate hypothesis was extended to the concept of particulate removal from the air by 'washout' by rainfall thus bringing the virus into contact with free-ranging animals, their feed and housing. Analysis demonstrated a highly significant statistical probability that the pattern of development following a primary FMD infection, is weather controlled.

Application of wind-borne infection ideas to the spread of Aujeszky's Disease April 1974

a. From communications with ADAS Cambridge Pig Unit, it would seem that the housed pig situation [illegible] is analogous [illegible] to the Fowl Pest situation ie the possibility of an intense, localised source of virus-infected particulates. The need for rainfall to bring the virus into contact with the animal etc is possibly an unnecessary criterion in this case (very little rain occurred anyway during the period in April 1974 near the Rishangles Triangle).

   Note:
   During most of April the UK was under the influence of a High pressure area with a centre or axis over northern parts giving generally light to moderate NE winds over East Anglia. A fair amount of mist and fog resulted but very little rain.

b. Using hourly wind data from Wattisham (25 km to SW of Rishangles) sectors where wind-borne infection was possible were ascertained. 'Green' Sectors where such wind-borne infection was not possible could also be shown.

c. One problem was knowing periods during which pigs were acting as potential sources of virus, (eg it is possible in case of Fowl Pest, that 'carriers' are present in any flock but their presence remains hidden until such time as the biological resistance becomes lowered - perhaps by diet deficiencies or 'environmental stresses'). We do know, though, that the virus produces symptoms within 48 hours of infection, ie animal is a potential source for virus spread for perhaps at least 48 hours before the infection dates noted and that the virus can survive within the housing under favourable circumstances for a period of a week or so.

d. Discussion of wind-sectors (Figures 3-7).

Fig 3: First infection noted: Standley 9 April.

I have looked first at wind directions beginning 1 April midnight and ending 6 April midnight.

Questions are:-

a. Could infection of Standley have come from another hidden source in Rishangles Triangle (Munter's muck heap?) in days prior to infection taking on at Standley?

b. If Standley were infectious for the week or so prior to 9 April, in which sectors could infection spread?

We see from Fig 3 for almost the entire period 1 to 6 April inclusive wind was from NE quadrant - infection borne to sector extending from NW to S ie Standley could

have spread infection to Bullen, Lomax and Abbott. Only during a period of 8 hours or so on 2 April was wind temporarily from South allowing Munter's muck heap to be potentially infectious to Lomax, Abbott, Bullen and Standley.

Fig 4: 7 April midnight to 9 April midday.

NE winds gave rise to potential infection sector to South and West ie during this (highly infectious?) period Standley could have been source of particulates which infected Bullen, Abbot, Lomax (and Frost, Chittock, Munter and Debenham).

Fig 5: 9 April midday to 14 April midday ie 5 days preceding the next outbreak at Lomax.

Again NE winds dominated although for 36 hours from 10 April midday to 11 April midnight a trough gave rise to a Southerly flow and produced a potential 180° infection sector North of source (it rained on 11th, pm).

Thus if Standley culled by 9 April midday and ceased to be source, Munter could have been a source for Lomax for these 36 hours. The heap would also have been a source for Chittock, Clarke (?), Gawthrup, Mayhew, Frost, Bullen, Wade Standley and the two other Munters.

Fig 6: 14 April midday to 17 April midday ie immediately prior to disease being noted at Abbott.

NE winds produced danger sector entirely to South of source. So Munter's muck heap is not a possible source although Standley (if not culled, of course,) Bullen, Frost and Munter (North) are.

Fig 7: 17 April midday to 19 April ie immediately prior to disease being noted at Bullen. Situation of potential infection sector as in Fig 6.

Unless Bullen was already infected by the 17th - the only sources in a position to infect between 17th and 19th were Standley, Wade and Frost.

REFERENCES

Basinger D (1979) — A brief description of Aujeszky's diseasein Great Britain and its relative importance. Brit Vet J 135, 215-224.

Cartwright S (1973) — 'What we know about Aujeszky's disease' Pig Farming Supplement p 54-55, October.

Smith C V (1964) — 'Some evidence for the windborne spread of Fowl Pest' Meteorological Magazine 93 p 257-263

Hugh Jones M E (1970) and Wright P B — 'Studies on the 1967-68 foot and mouth disease epidemic' J Hyg., Camb 68, p253

Any comments or suggestions on this paper should be referred to the author.

Meteorological Office,
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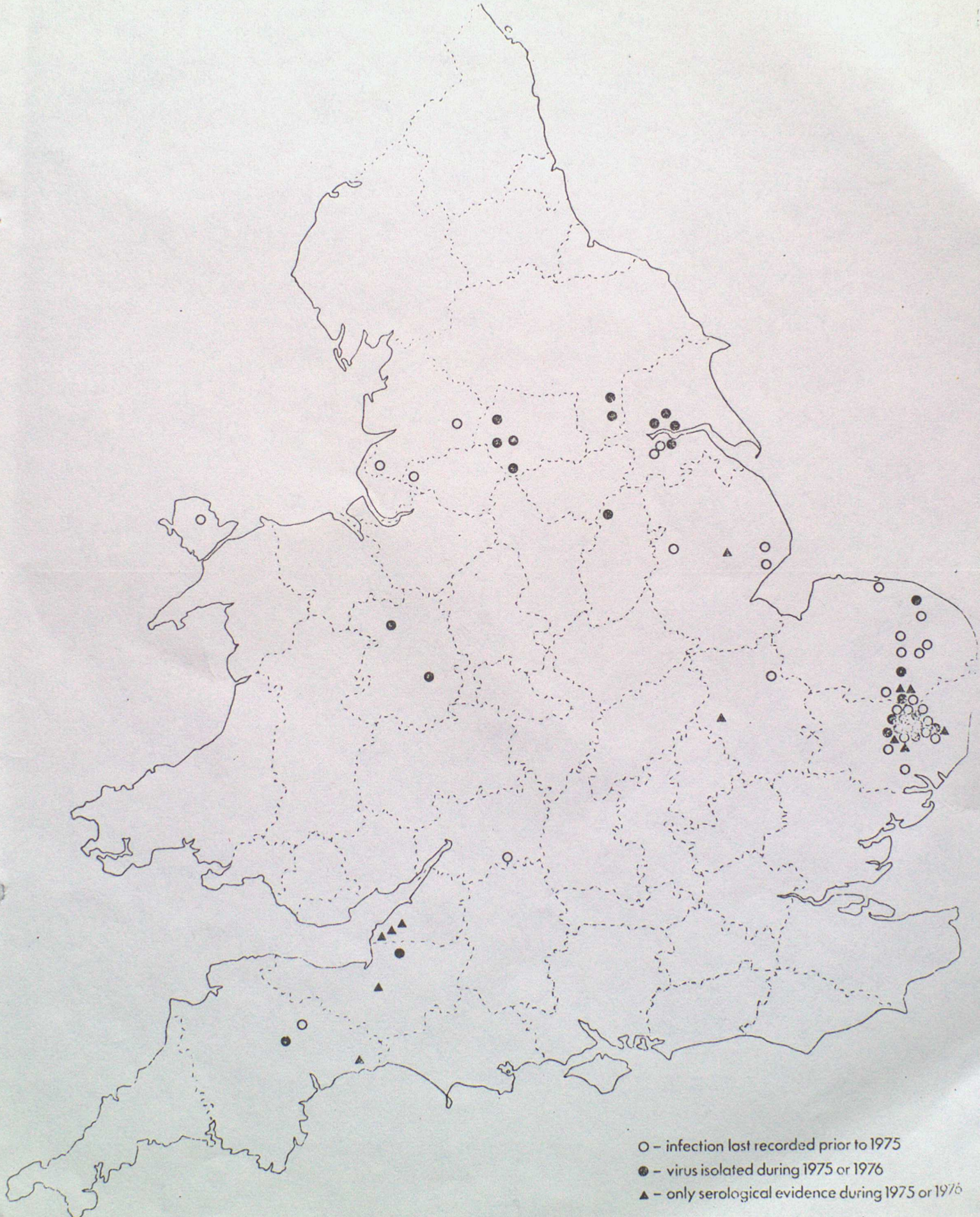
Aujeszky's Disease - Known Infected Premises

Fig 1


○ – infection last recorded prior to 1975
● – virus isolated during 1975 or 1976
▲ – only serological evidence during 1975 or 1976

NOTE: Aujeszky's disease has not yet been recorded in Scotland.

AUJESZKY'S DISEASE

Fig 2

RISHANGLES TRIANGLE R.+D. PROJECT

1977

FIG. 3. WATTISHAM APRIL 1974

1ST APRIL 0001 - 6TH APRIL 2300 HRS

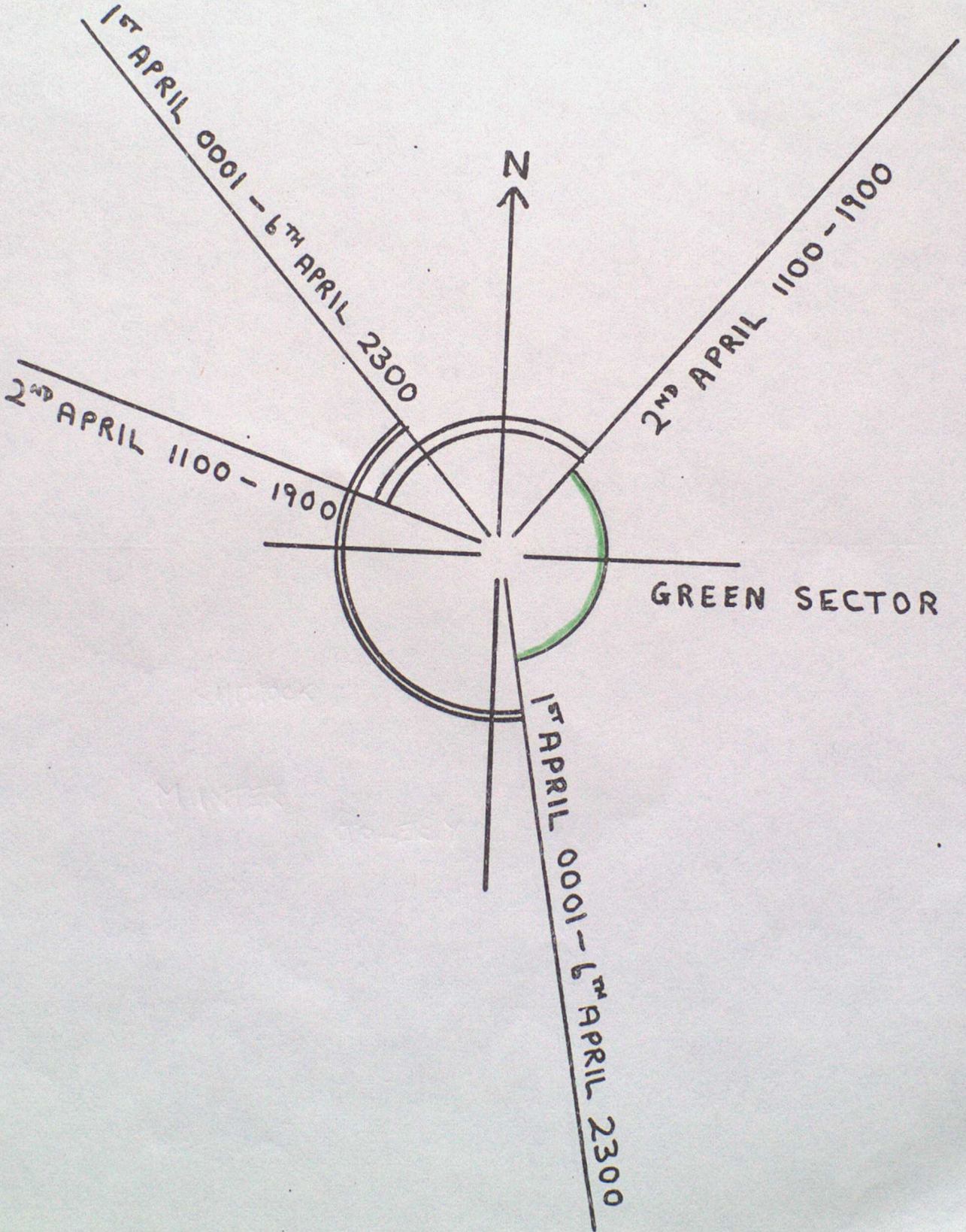


FIG. 4. WATTISHAM APRIL 1974

7TH APRIL 0001 - 9TH APRIL 1200 HRS

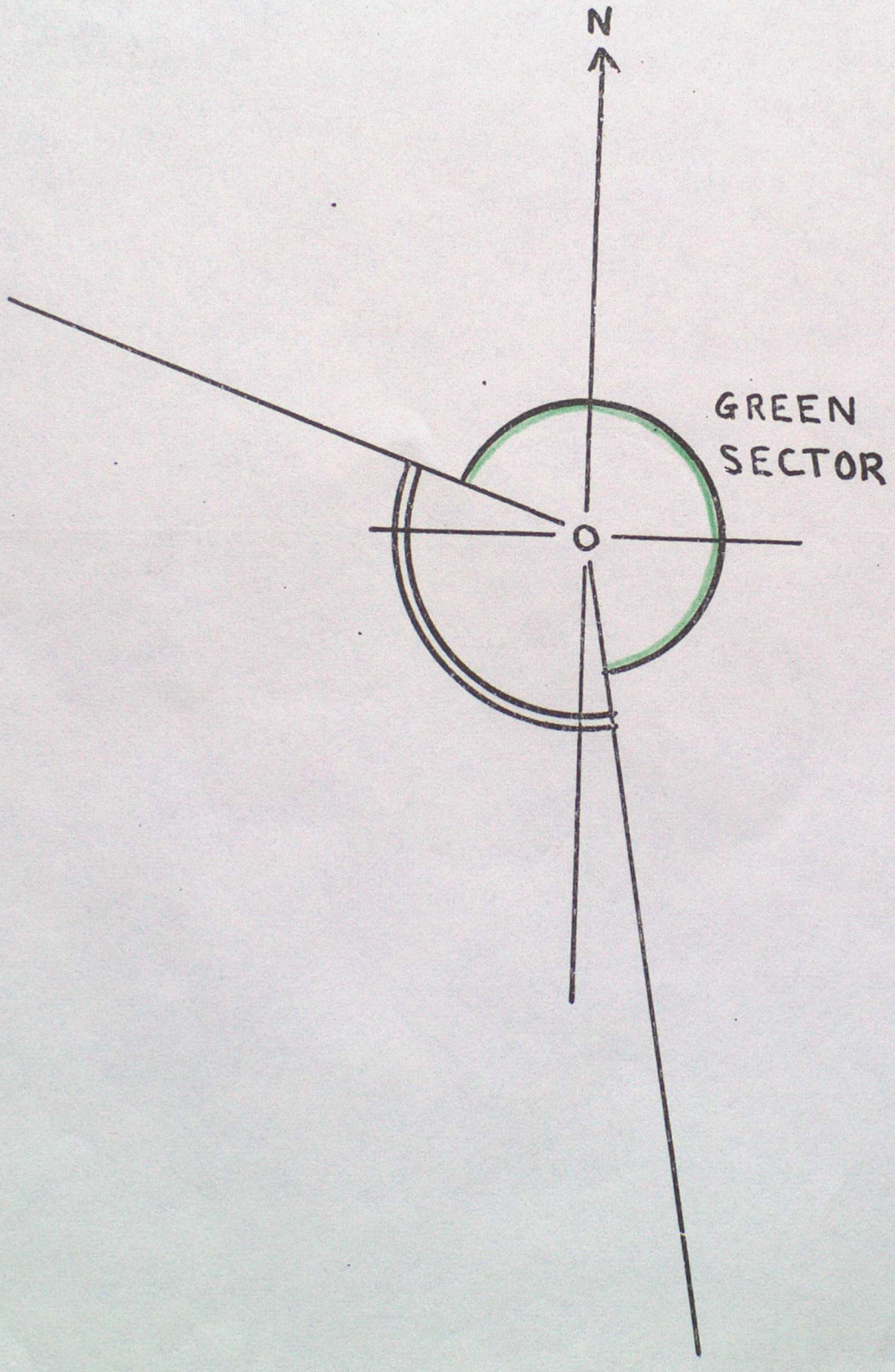


FIG. 5. WATTISHAM APRIL 1974

9TH APRIL 1300 - 14TH APRIL 1200 HRS

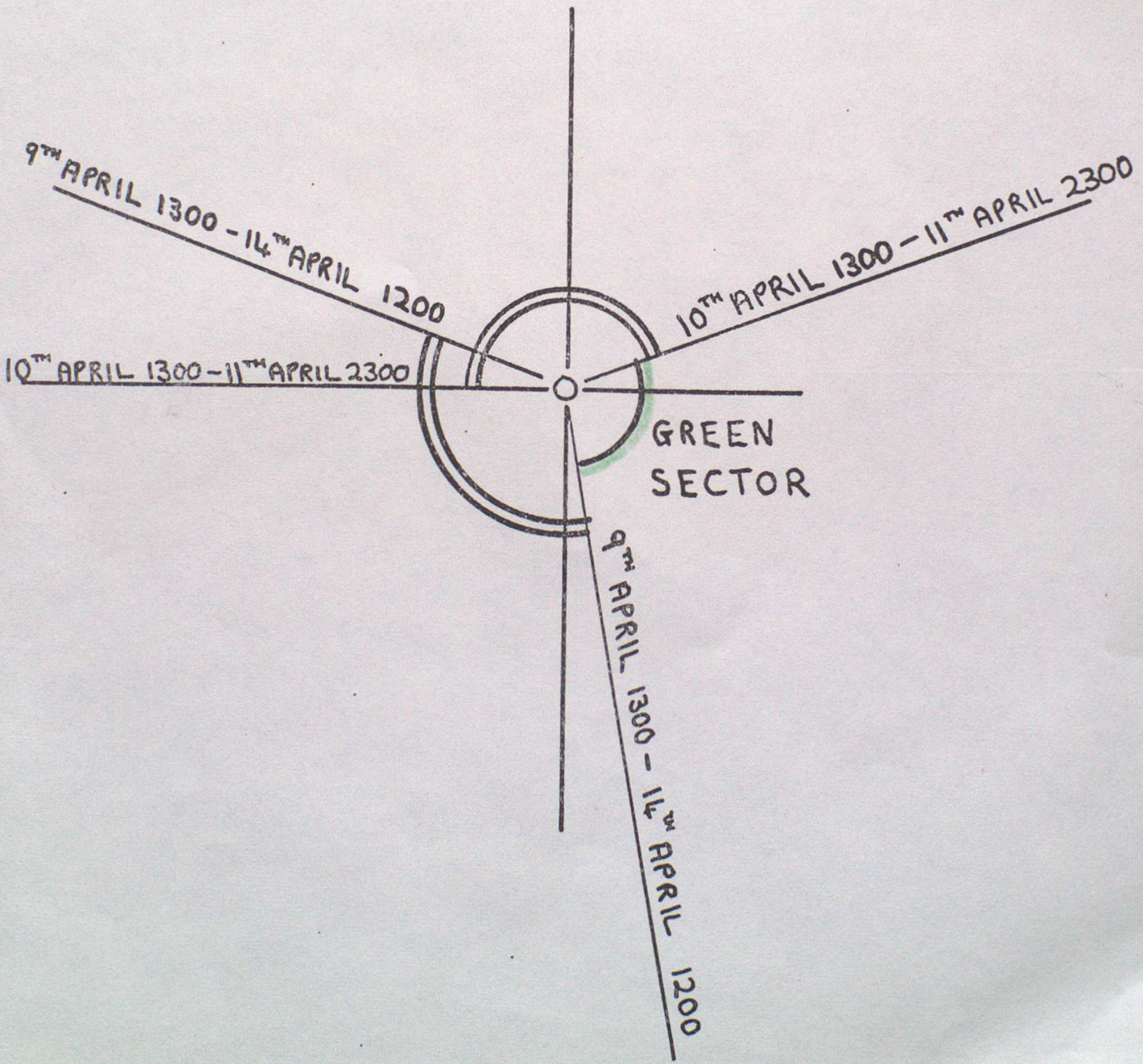

9TH APRIL 1300 - 14TH APRIL 1200
10TH APRIL 1300 - 11TH APRIL 2300
10TH APRIL 1300 - 11TH APRIL 2300
GREEN SECTOR
9TH APRIL 1300 - 14TH APRIL 1200

FIG.6. WATTISHAM APRIL 1974

14TH APRIL 1300 – 17TH APRIL 1200 HRS

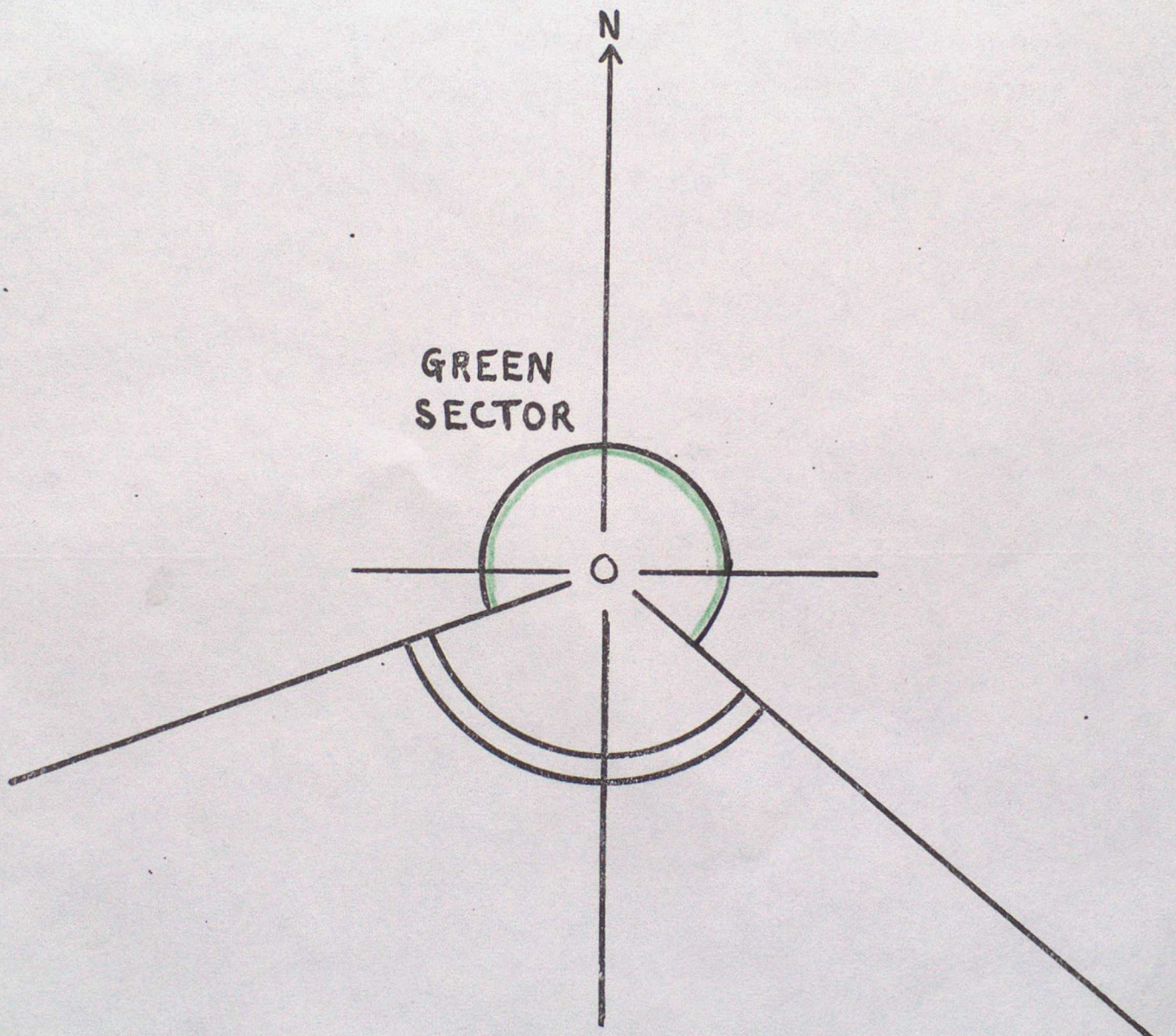


FIG. 7. WATTISHAM APRIL 1974

17TH APRIL 1300 – 19TH APRIL 1200 HRS